

A SURVEY OF THE SPECIES OF THE GENUS *PRONUCULA* IN NEW SOUTH WALES

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Plates 11, 12

INTRODUCTION

In 1961 Mr. J. Voorwinde collected some shell sand on the beach of Narrabeen and sent it to Mr. L. van der Slik in Rotterdam, who presented me with a part of it. I encountered hundreds of interesting small molluscs and decided to do some work on this collection. Systematically *Pronucula* was the first genus to be studied. One species appeared to be new for New South Wales: *Pronucula vincentiana*. Later I had the opportunity to examine some Nuculidae from various localities in New South Wales in the Collection Van der Slik. Here I found another species new for the fauna of New South Wales: *Pronucula cancellata*.

It seemed useful to give descriptions and figures of these species together with descriptions and illustrations of the other species of this genus that are known to occur in this region, because the original descriptions are often brief and the original illustrations rather poor in some cases. It is likely, after all, that more allied species will be found and for this reason the species have to be described very accurately.

I wish to thank Dr. C. O. van Regteren Altena, Curator of Molluscs of the Leiden Museum, Dr. D. F. McMichael, formerly Curator of Molluscs of the Australian Museum, and Mr J. Voorwinde for their worthful help during the preparation of this survey. Our Museum is much indebted to Mr. L. van der Slik, who kindly presented us with some specimens of *Pronucula cancellata*. Together with these all the Narrabeen shells treated below have been added to our Museum Collection. The drawings have been made by the author, with the exception of figures 1a-c which have been copied from Hedley's original figures.

SYSTEMATICS

The material at my disposal is far too limited to serve for an extensive study of the relationship of the species dealt with and of those recorded from other regions. All the species seem to be less than 5 mm in length and have a more or less strong sculpture, except for *Pronucula micans*. For the present I regard the hinge formation as the most important generic feature and the species are treated in an order according to their more or less pronuculid hinge.

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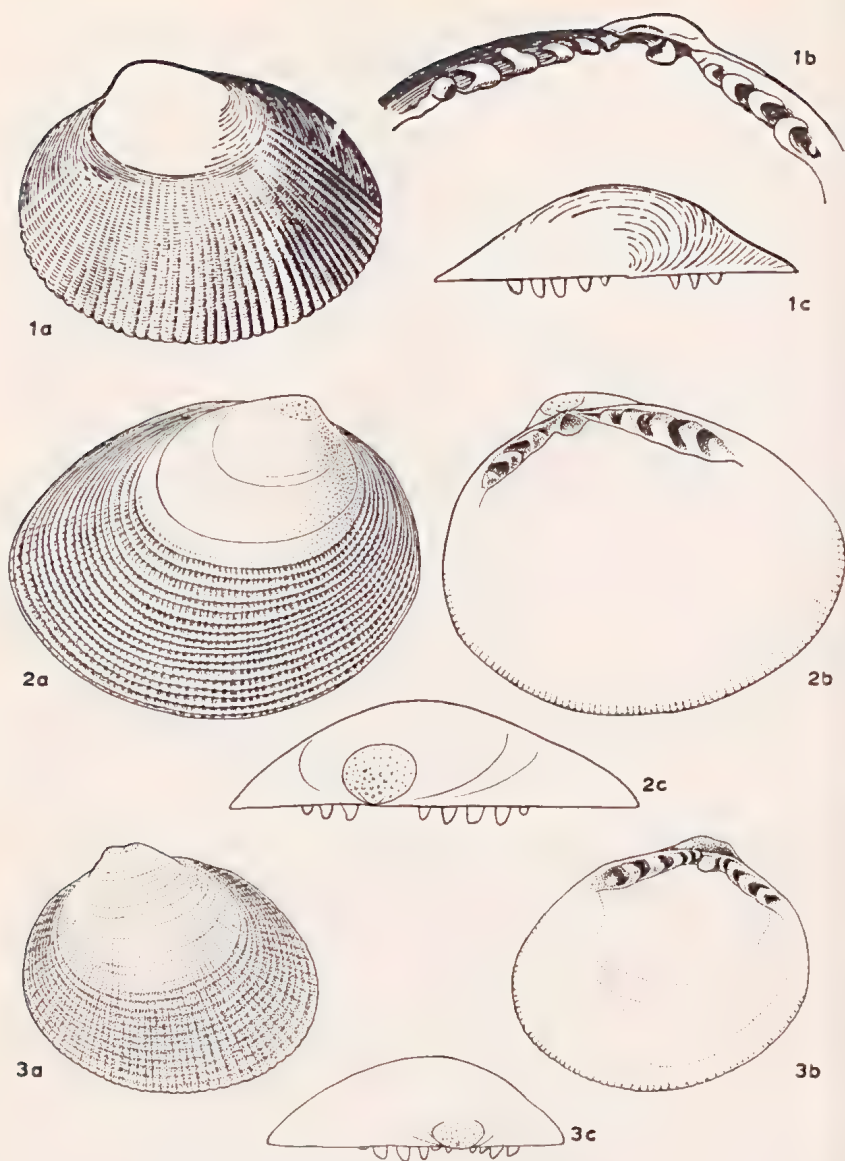


PLATE 11

Fig. 1a-c, *Pronucula decorosa* Hedley (after Hedley).

Fig. 2a-c, *Pronucula cancellata* Cotton.

Fig. 3a-c, *Pronucula vincentiana* Cotton & Godfrey

Pronucula decorosa Hedley, 1902

Plate 11, figures 1a-c

Pronucula decorosa—C. Hedley, *Mem. Aust. Mus.* 4, part 5, 1902, p. 290, fig. 39.

Remarks: Although this species is not represented in the material studied by me, the original figure is copied to complete this survey of the New South Wales *Pronucula* species known so far. The following data are taken from Hedley's description. The thin shell is covered by a dense, tough, brown epidermis, on which numerous pustules are irregularly arranged. Beneath the epidermis the shell is white, glossy and brilliantly nacreous. There is almost no sculpture on the umbonal third. About 30 radiating riblets traverse the rest of the valve, except a small anterior and posterior space. (Hedley's figure, however, shows 41 ribs). These are over-ridden by fine, concentric hair lines, which extend on the whole length of the valve. The prodissoconch is conspicuous. The chondrophore is projecting, almost symmetrical and perpendicular, and distant from the teeth. The anterior teeth row has six teeth, the posterior row has five teeth. The pallial line is indistinguishable.

Measurements: length 2.5 mm, height 2 mm, section (single valve) 0.7 mm.

Pronucula cancellata Cotton, 1930

Plate 11, figures 2a-c

Pronucula decorosa Hedley—W. L. May, *Proc. Roy. Soc. Tasm.* 1915, p. 81, plate 8 figs. 42-42a.

Pronucula cancellata sp. nov.—B. C. Cotton, *Rec. S. Aust. Mus.* 1930, Vol. 4 no. 2, p. 224.

Remarks: This species was not yet known from New South Wales. Our small and probably young shells agree with May's illustrations. In outline they resemble *Pronucula hedleyi* but they are much more rounded, the posterodorsal angle, if any, is very obtuse, the shells are less inequilateral and more convex. The embryonic shell is granulated and the umbonal part of the shell is smooth. There is only one difference between our shells and those of May, as described by Cotton: the concentric ribs are much stronger than the radial ribs in stead of being equally valid. All the same the concentrics are slightly thicker where they are crossed by radials, which may give the shell a really cancellated character. Our biggest valve (length 1.60 mm) has 24 concentric ribs. The number of radials increases with the growth and is about the same as in *Pronucula hedleyi*. The radials are rather flat and do not extend on the anterior and posterior parts of the shell. The colour of the epidermis is brownish white or light brown and under it the shells are almost always strongly nacreous, especially near the umbo. Inside the shells are silverish white, and the external concentric sculpture can be seen. The hinge seems to be very much like that of *Pronucula decorosa*. The hinge line is arched, there are few teeth—three in the anterior row and five in the posterior—and the chondrophore is perpendicular and well separating the teeth rows. The teeth are quite heavy, and the hingeplate is relatively broad. Adductor scars and pallial line are indistinct. The ventral margin is crenulated both the interior and the exterior, corresponding with the radial sculpture.

Measurements: Neither May nor Cotton gave the measurements of their

shells. Our figured valve has a length of 1.44 mm, a height of 1.15 mm and a section of 0.38 mm. Our biggest valve measures: length 1.60 mm, height 1.25 mm, section 0.40 mm.

Specimens examined: Four complete shells and two valves dredged at Dolls Point, George's River, 8-10 fathoms, in 1961 or 1962, and also sent to Mr. Van der Slik by Mr. Voorwinde.

Pronucula vincentiana Cotton & Godfrey, 1938

Plate 11, figures 3a-c

Pronucula vincentiana—B. C. Cotton and F. K. Godfrey, *The Molluscs of South Australia, Part I, Pelecypoda*, 1938, p. 38, fig. 7.

Remarks: The valves of this newly recorded species are rather solid, translucent, white or yellowish-white and polished. For about a third of the height the umbonal part of the shell has a smooth appearance. The radial sculpture on this part consists of very delicate striae. These striae may cover the whole umbonal area or only the anterior and posterior parts or even be absent. The embryonic shell is distinguishable by its granulated surface caused by numerous microscopic pits. In younger shells the umbos are bifid. During the growth this feature becomes less distinct because the anterior part of the bifid umbo loses its strongly protruding character. (The figured valve is not yet adult and still has a bifid umbo. For the same reason the discussed umbonal third is relatively too big). The rest of the shell has both radial and concentric ribs. There are over 70 radial ribs, being about as broad as their interstices. These radials extend on the anterior and posterior ends of the shell too, in which respect this species differs from the other species with both radial and concentric sculpture mentioned in this paper. The concentric ribs tend to be somewhat stronger and more pronounced than the radials and they are not too regularly placed, the interstices being sometimes broader than the ribs. The radials and concentrics together build rectangular spaces. The hinge is typically that of a *Pronucula*: the hinge line is arched, there are few teeth and the rows of teeth are separated by a perpendicular chondrophore. The anterior row consists of four V-shaped teeth and the posterior row consists of six teeth, the biggest also V-shaped. The adductor scars are hardly visible and the pallial line is indistinguishable. The ventral and posterior margins are crenulated. The crenulation corresponds with the radial sculpture.

Measurements: of the figured valve, length 1.04 mm, height 0.90 mm, section (single valve) 0.32 mm. Our biggest valve has a (reconstructed) length of 1.3 mm and a height of 1.1 mm. The holotype has a length of 2.5 mm, a height of 2 mm and a section of 1 mm (Cotton & Godfrey, 1938).

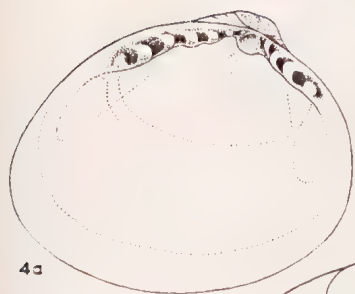
Specimens examined: One complete shell and five odd valves in shell sand, Narrabeen.

PLATE 12

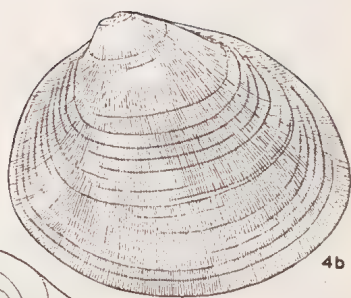
Fig. 4a-c, *Pronucula pusilla* (Angas).

Fig. 5a-f, *Pronucula hedleyi* (Pritchard & Gatliff); a-c, one valve; d, the biggest valve from Narrabeen, somewhat obsolete; e-f, two outlines of other valves.

Fig. 6a-c, *Pronucula micans* (Angas).



4a



4b



4c



5a



5b



5c



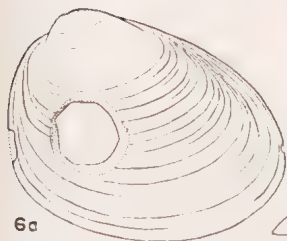
5d



5e



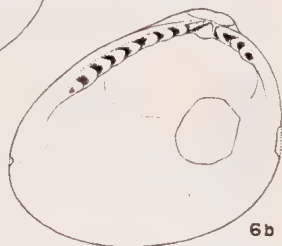
5f



6a



6c



6b

Pronucula pusilla (Angas, 1877)

Plate 11, figures 3a-c

Nucula pusilla Angas—G. F. Angas, *Proc. Zool. Soc. Lond.*, 1877, p. 177, plate 26, fig. 26.

Remarks: The outline of this species does not show important variations. The embryonic shell has a granulated structure and in younger shells the umbos are bifid. The radial sculpture consists of numerous very delicate striae, which in most specimens are distinct only on the anterior and posterior parts of the valves. The radial striae are crossed by a great number of growth lines (called "striae" in Angas' description). Some of my shells are pale greenish, most of them are white. The greenish colour is strongest towards the margins, especially the dorsal margin. Inside the colour corresponds with the colour on the exterior. If greenish, this colour is most intensive in the hinge components and the dorsal margin and less towards the other margins. The hinge line is arched and the teeth rows are separated by a perpendicular chondrophore. The anterior row has four distinct teeth and sometimes a fifth, very small, tooth-like projection near the chondrophore. The posterior row has six or seven teeth, the tooth nearest to the chondrophore again being very small. The biggest teeth are V-shaped. In the greenish shells, which I consider to be the most fresh ones, the teeth are rather pointed but not very long. The adductor scars are visible, the pallial line is not. The ventral margin is not crenulated, a feature that this species has in common with *Pronucula micans* (Angas).

Measurements: The figured valve has the following measures: length 1.03 mm, height 0.86 mm and section (single valve) 0.29 mm. The biggest valve in our sample has a length of 1.08 mm and a height of 0.90 mm. The holotype is slightly bigger (Angas, 1877).

Specimens examined: Three complete shells and 43 loose valves in shell sand, Narrabeen.

Pronucula hedleyi (Pritchard & Gatliff, 1904)

Plate 12, figures 5a-f

Nucula minuta—J. E. Tenison Woods, *Proc. Roy. Soc. Tasm.* for 1876, (1877), p. 156.

Pronucula minuta Ten. Woods—C. Hedley, *Mem. Aust. Mus.* 4, part 5, 1902, p. 291, fig. 40.

Nucula hedleyi—G. B. Pritchard and J. H. Gatliff, *Proc. Roy. Soc. Vict.*, 17, (n.s.), 1904, p. 237.

Pronucula hedleyi Pritchard & Gatliff—B. C. Cotton and F. K. Godfrey, *The Molluscs of South Australia, Part I, The Pelecypoda*, 1938, p. 39.

Remarks: Besides the shells from Narrabeen I examined three samples from other localities near Sydney in the Collection Van der Slik and one from Tasmania and another from South Australia in our Museum Collection. In 1904 Pritchard and Gatliff already disagreed with Hedley who in 1902 placed this species in his genus *Pronucula*. Most probably these different views are due to the changes that growing shells of this species undergo, and to the great individual variability. Generally speaking bigger shells are more triangular in form and their hinges are also less pronuculid. Hedley's figure of the hinge, how

indistinct it may be, shows clearly that the chondrophore tends to be oblique. In adult shells with a length of about 3 mm or more—like the valve of figure 5d—the posterior teeth row overlaps the triangular pit in the chondrophore and therewith the anterior teeth row, and moreover there are no edentulous spaces between teeth rows and chondrophore. In smaller valves—still in that of figure 5a-c—there are some minute tooth-like projections immediately beneath the umbo and well separated from the teeth rows by an edentulous space on the hinge plate. The more triangular form of bigger shells is caused by their relatively greater height and by the fact that the posterodorsal angle becomes less distinct during the growth. On the other hand there are young shells without a trace of this angle. The anterior side of the shell is usually subtruncated but this feature too may be indistinct or even absent. The typical form of the species seems to be represented in figure 5a for the halfgrown shells and in figure 5d for the fullgrown ones. The outlines in the figures 5e-f illustrate the variability. They are drawn on the same scale as figure 5a-c, while figure 5d is drawn on a smaller scale. The embryonic shell is white and has a granulated structure. In younger shells the umbo is bifid. The umbonal part, about a fourth of the shell, has only concentric growth lines, no radial sculpture, and is the most translucent part in young shells.

The radial sculpture on the rest of the shell does not extend on the anterior and posterior ends of the shell. The radial ribs are very flat, the interstices are narrow and groove-like. The number of ribs increases with the growth of the shell from about 60 in small shells to about 100 in adult ones. In some shells these ribs are hardly discernible, in others they give the impression as if they are situated under the surface of the shell. In most shells, however, they are distinct towards the ventral margin.

In nearly all valves the growth lines are strongly pronounced on the anterior and posterior parts of the valve. In bigger valves some of these concentric "ribs" near the ventral margin may run over the whole valve surface. Then the radials can be seen only between the concentrics.

The colour of the shells is white or faintly yellowish white and polished and the periostracum is beige-coloured or light brown and shining. Inside the shells are shining white or silverish-white, sometimes nacreous.

The anterior teeth row has from two teeth in specimens with a length of 1 mm to six teeth in adult specimens. The posterior row has respectively from six to twelve teeth. The teeth near the chondrophore are often very small. The biggest teeth are V-shaped. In many cases the adductor scars and the pallial line are difficult to see. The ventral margin is finely crenate, corresponding with the radial sculpture on the exterior.

Measurements: of the valve in figure 5a-c: length 1.91 mm, height 1.56 mm, section 0.46 mm. Measurements of the biggest Narrabeen valve in our collection (figure 5d): length 3.0 mm, height 2.5 mm and section 0.7 mm. According to Cotton and Godfrey the species attains a length of 4 mm.

Specimens examined: One specimen and 17 mostly very young valves in shell sand, Narrabeen. Examined in the Collection Van der Slik: two samples from Dolls Point, George's River, 8-10 fathoms, and one sample from Watson's Bay.

Pronucula micans (Angas, 1878)

Plate 12, figures 6a-c

Nucula micans—G. F. Angas, *Proc. Zool. Soc. Lond.*, 1878, p. 864, plate 54, fig. 16.

Pronucula micans Angas—B. C. Cotton & F. K. Godfrey, *The Molluscs of South Australia, Part I, Pelecypoda*, 1938, p. 40, fig. 12.

Remarks: Although this species was recorded from New South Wales by Cotton and Godfrey (1938), it is not mentioned in the Reference List of this region by T. Iredale and D. F. McMichael (1962). The solid shell is white and polished, both the exterior and the interior. The embryonic shell is finely granulated and the umbo is slightly bifid, which indicates that the valve belonged to a young animal. About two fifths—umbonal—are not translucent, the other part of the shell is more or less translucent. There is no radial sculpture which distinguishes this species from all the other species dealt with. Angas' specimens were "very finely concentrically striated, the striae occasionally running into each other". Cotton & Godfrey stated, however, that *Pronucula micans* has a smooth shell. My valve has some pronounced growth lines, but it is rather smooth than really sculptured.

In my opinion the hinge line is rather angulated as in *Ennucula*, and the chondrophore, although not projecting far beyond the hinge plate, is rather oblique as in *Ennucula* than perpendicular as in *Pronucula*. The adductor scars are only partly visible. I could not distinguish the pallial line. The margins are not crenulated.

Measurements: length 1.18 mm, height 0.99 mm and section 0.27 mm. According to Cotton & Godfrey the species attains a length of 4.5 mm. *Specimens examined:* A single valve in shell sand, Narrabeen.